

REMARKS

In view of the above amendments and following remarks, reconsideration and further examination are requested.

With regard to the objection to the drawings as expressed in section 2 on page 2 of the Office Action, this objection has been addressed, not by amending the drawings, but rather by amending the specification. In this regard, page 6 of the substitute specification has been amended such that it is believed to now be clear what is intended by the "line that is tangent" and the "radial distance" as recited in claims 14-19. No new matter has been entered. Please note that by amending the substitute specification in such a manner it is believed that proposed drawing amendments are not necessary. Additionally, with regard to one of the ends of the container being formed by inwardly curling its edge with a circumferential edge of a paper material bottom plate, as recited in claim 10, it is respectfully submitted that this feature is shown in Figure 10 and is described in the paragraph bridging pages 8 and 9 of the substitute specification.

With regard to the double patenting rejection as expressed in sections 3 and 4 on pages 2-3 of the Office Action, it is respectfully submitted that this rejection is in error because the claims of the instant invention are patentability distinct from claims 1 and 2 of U.S. Patent No. 6,502,741 in that claims 1 and 2 of the '741 patent do not require that the curled portion is "more dense" than the plural wound layers, as required by each of the independent claims of the instant invention.

With regard to the 35 U.S.C. 112, first paragraph, rejection as expressed in section 6 on page 3 of the Office Action, please note that Figures 8 and 9 provide support for the curled portion forming an angle with the roll of paper that is greater than 0° and less than 180°. To provide literal support for this feature page 8 of the substitute specification has been amended. No new matter has been entered. Additionally, Figure 10 provides support for one of the ends of the container being formed by inwardly curling its edge with a circumferential edge of a paper material bottom plate. And, the relationships as set forth in claims 14-19 are supported by Figure 2 of the original specification, and by amending

the substitute specification at page 6 as expressed above literal support for these relationships is now provided.

With regard to the 35 U.S.C. 112, second paragraph, rejection as expressed in section 7 on pages 3-4 of the Office Action, in claim 9 the misspelling of --detachably-- has been corrected. Also, claims 9, 10 and 16-19 have been amended to make it more clear as to which curled portion is being referred to throughout the claims.

With regard to the 35 U.S.C. 112, second paragraph, rejection of claims 14-19, by the aforementioned amendments made to page 6 of the substitute specification it is now believed to be clear what is meant by the "line that is tangent", the "radial distance" and the "line defined by the inner cylindrical surface of said roll of paper". It is also believed to be clear how a line that is tangent to the surface to the curled portion is parallel to the axis of the roll of paper. With regard to the Examiner's observation that the cylindrical surface of the roll is parallel to the surface of the curled portion, while this accurate, it is also respectfully submitted to be accurate that a line defined by this cylindrical surface is parallel to the aforementioned line that is tangent to the surface of the curled portion, and accordingly, claims 14-19 have not been further amended to address this issue.

In section 8 on page 4 of the Office Action, the Examiner rejected claim 6 under 35 U.S.C. 102(b) as being anticipated by GB '827. This rejection is respectfully traversed for the following reasons.

In supporting this rejection, the Examiner has taken the position that the curled portion of GB '827 is more dense than remaining portions of the tube 7 due to action of former 16; however, nowhere in GB '827 is it stated that action of the former 16 results in the curled portion being more dense than a remainder of the tube. Additionally, it cannot be inferred from GB '827 that the action of the former 16 results in the curled portion being more dense, because the former 16 can reshape the tube 7 so as to exhibit the curled portion, without making this curled portion more dense than the remainder of the tube. Accordingly, because GB '827 does not express that the curled portion is more dense than the remainder of the tube 7, and because operation of the former 16 will not inherently

result in a curled portion that is more dense than the remainder of the tube, it is respectfully submitted that claim 6 is not anticipated by GB '827.

In section 9 on pages 4-5 of the Office Action, the Examiner has rejected claims 9, 10 and 16-19 under 35 U.S.C. 103(a) as being unpatentable over GB '827 in view of Beadle and UK '163. This rejection is respectfully traversed because, for reasons as expressed above, GB '827 does not disclose or suggest a curled portion that is more dense than a remainder of the tube 7, and because Beadle and UK '163 do not resolve this deficiency of GB '827. Accordingly, it is respectfully submitted that claims 9, 10, and 16-19 are not obvious over a combination of GB '827, Beadle and UK '163.

In section 10 on page 5 of the Office Action, the Examiner has rejected claim 6 under 35 U.S.C. 103(a) as being unpatentable of GB '827 in view of either Perkins or Wright, and the Examiner has rejected claims 9 and 10 under 35 U.S.C. 103(a) as being unpatentable over GB '827 in view of Beadle and UK '163 and further in view of either Perkins or Wright. These rejections are respectfully traversed for the following reasons.

With regard to Perkins, this reference discloses an outwardly angled curled portion that is formed by "outwardly" curling a respective edge of a container body and **not** "inwardly" curling the edge as shown by GB '827. Additionally, in Perkins the outwardly curled portion is angled relatively outwardly in order to form a connection between a lower edge of a body "n" of a can and a bottom "m" of the can. In GB '827, the inwardly curled portion is not made in order to join an edge of paper board tube 7 to a closure member, but rather the closure member is to be attached to the paper board tube by merely being forced thereinto, and is in no way deformed along with the paperboard tube, as is the bottom "m" and container body "n" of Perkins. Furthermore, Perkins pertains to cans for transportation and storage of petroleum, whereas GB '827 is concerned with a paperboard container. Still further, nowhere in Perkins is it disclosed or suggested that the curled portion of Perkins is more dense than remaining portions of the body "n" of the can. Because of these differences between GB '827 and Perkins, one having ordinary skill in the art would not have been motivated to combine the teachings thereof.

With regard to Wright, this reference pertains to a specific neck construction of a paper material bottle such that this bottle can be successfully handled and manipulated by capping and filling machinery. Specifically, the neck tube or mouth of the bottle is stiffened and held in a desired flattened form by an annular member or neck ring 4 which is composed of metal or other relatively stiff material, and is enclosed within a paper wall of the mouth or neck. Inner and outer paper plies of the paper wall of the neck have positioned therebetween the neck ring 4, and the inner and outer paper plies and the ring 4 are tightly compressed and sealed together to form a solid wall. It is the inclusion of the neck ring 4 that provides adequate support of the neck portion of the bottle such that the bottle can be handled and manipulated by capping and filling machinery.

GB '827, on the other hand, is not concerned with supporting a mouth or neck portion of the paperboard tube 7 such that the paperboard tube can be handled and manipulated by machinery. Rather, GB '827 is concerned with a paperboard tube and a lid which can be repeatedly removed from and replaced on the tube by a consumer. Because of this difference between GB '827 and Wright, one having ordinary skill in the art would not have been motivated to combine the teachings thereof.

Furthermore, a purpose of GB '827 is to provide a bead 8 whose inner diameter C is generally the same as the inner diameter of the paperboard tube 7 so as to allow a closure or lid to be pushed through the bead into sealing engagement with an inside wall of the main body of the tube. Were the bead or curled portion 8 of GB '827 formed in a manner as taught by Wright, i.e. by providing a support ring within the bead and then compressing the bead, then the diameter of the bead or curled portion would be much greater than the inside diameter of the paper board tube 7 such that sealing to be attained by the closure would be considerably lessened. Accordingly, one having ordinary skill in the art would not have been motivated to modify GB '827 in view of the teachings of Wright.

For the above reasons, claims 6, 9 and 10 are not obvious for the reasons as expressed in section 10 on page 5 of the Office Action. Thus, claims 6, 7, 9, 10 and 14-19 are allowable.

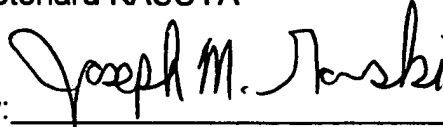
Additionally, claims 20-28 have been added to further distinguish the invention from the references relied upon by the Examiner. Support for the subject matter of these claims is found in the original drawings and throughout the original specification. And, page 5 of the substitute specification has been amended to provide literal support for the language of claims 20-28. No new matter has been entered.

In view of the above amendments and remarks, it is respectfully submitted that the present application is in condition for allowance and an early Notice of Allowance is earnestly solicited.

If after reviewing this Amendment, the Examiner believes that any issues remain which must be resolved before the application can be passed to issue, the Examiner is invited to contact the Applicant's undersigned representative by telephone to resolve such issues.

Respectfully submitted,

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9. A fiber drum comprising:

a roll of paper having an axis, two open ends and an outer straight cylindrical circumferential surface, plural wound layers with a cured adhesive between said plural wound layers, and a pressed curled portion at each of said two open ends such that each of said pressed curled [portion] portions is more dense than said plural [would] wound layers, each of said pressed curled [portion] portions having an outer circumferential surface, wherein each of said pressed curled portions is angled radially outwardly relative to said outer straight cylindrical circumferential surface of said roll of paper such that said outer straight cylindrical circumferential surface of said roll of paper forms an angle with said outer circumferential surface of each of said pressed curled portions that is greater than 0° and less than 180° and faces away from said axis of said roll of paper, and wherein each of said pressed curled portions is formed by inwardly curling [a respective] an edge of each of [at least one of] said two open ends while the adhesive between said plural wound layers is in a non-cured state;

a paper material cover plate detachably [detactably] joined to said pressed curled portion at one of said two open ends such that the opening at said one of said two open ends is closed; and

a paper material bottom plate fixedly joined to said pressed curled portion at the other of said two open ends such that the opening at said other of said two open ends is closed.

10. A fiber drum comprising:

a roll of paper having an axis, two open ends and an outer straight cylindrical circumferential surface, plural wound layers with a cured adhesive between said plural wound layers, and a pressed curled portion at each of said two open ends such that each of said pressed curled portions is more dense than said plural [would] wound layers, each of said pressed curled portions having an outer circumferential surface, wherein said pressed curled portion at one of said two open ends is angled radially outwardly relative

to said outer straight cylindrical circumferential surface of said roll of paper such that said outer straight cylindrical circumferential surface of said roll of paper forms an angle with said outer circumferential surface of said pressed curled portion at said one of said two open ends that is greater than 0° and less than 180° and faces away from said axis of said roll of paper, and wherein each of said pressed curled portions is formed by inwardly curling [a respective] an edge of each of [said at least one of] said two open ends while the adhesive between said plural wound layers is in a non-cured state;

a paper material cover plate detachably joined to said pressed curled portion at said one of said two open ends such that the opening at said one of said two open ends is closed; and

a paper material bottom plate fixedly joined to said pressed curled portion at the other of said two open ends such that the opening at said other of said two open ends is closed, wherein [the] said pressed curled portion at said other of said two open ends is formed by inwardly curling [the] said edge of said other of said two open ends together with a circumferential edge of said paper material bottom plate, while the adhesive between said plural wound layers is in a non-cured state, to fixedly join said edge of said other of said two open ends to said paper material bottom plate.

16. The cylindrical body as recited in claim 9, wherein each of said pressed curled portions includes an inner circumferential surface defining a line that is tangent thereto and parallel to said axis of said roll of paper, and wherein said roll of paper has an inner cylindrical surface defining a line that is parallel to said axis of said roll of paper, with a radial distance between the line that is tangent to said inner circumferential surface of a respective said curled portion and the line defined by the inner cylindrical surface of said roll of paper being no greater than 1mm.

17. The cylindrical body as recited in claim 16, wherein the line that is tangent to said inner circumferential surface of a respective said curled portion is not radially further from said axis of said roll of paper than is the line defined by the inner cylindrical circumferential surface of said roll of paper.

18. The cylindrical body as recited in claim 10, wherein said curled portion at said one of said two open ends includes an inner circumferential surface defining a line that is tangent thereto and parallel to said axis of said roll of paper, and wherein said roll of paper has an inner cylindrical surface defining a line that is parallel to said axis of said roll of paper, with a radial distance between the line that is tangent to said inner circumferential surface of said curled portion at said one of said two open ends and the line defined by the inner cylindrical surface of said roll of paper being no greater than 1mm.

19. The cylindrical body as recited in claim 18, wherein the line that is tangent to said inner circumferential surface of said curled portion at said one of said two open ends is not radially further from said axis of said roll of paper than is the line defined by the inner cylindrical circumferential surface of said roll of paper.



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of the fiber drum

Fig. 13 is an explanatory view showing a step of removing powder from one opening of a conventional fiber drum that is tilted; and

Fig. 14 is a partially cross sectional front view of another conventional fiber drum.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0014] A first embodiment of the present invention will be described in more detail referring to the relevant drawings.

[0015] Fig. 1 is an external view showing a cylindrical body of a fiber drum of the embodiment. Fig. 2 is a partially cross sectional front view of the cylindrical body.

[0016] As shown, the cylindrical body 1 of the fiber drum consists mainly of a roll 2 of a paper material with an adhesive. The roll 2 may be made of a plurality of paper sheets or a single sheet of paper which is rolled as will be explained later.

[0017] The roll 2 in its vertical position has an opening 3 thereof provided at the upper end and an opening 4 at the other end. The roll 2 has an upper edge curled inwardly at the one opening

3 forming a curled portion 5 which is oval in cross section and annular in plan view as continuous along the circumference. The curled portion 5 is tilted outwardly and radially of the roll 2. The curled portion 5 is defined by an end portion of the roll 2 which is curled upon itself and is so tightly pressed as to eliminate the hollow space and its thickness is substantially 1 mm greater than the thickness of the roll 2. The lower edge at the other

opening 4 of the roll 2 also is inwardly curled to form a curled portion 6 which is identical in size to that of the curled portion 5. Each of the curled portions 5 and 6 is defined by paper and is free of any interior support ring.

[0018] The cylindrical body 1 having the above arrangement is accompanied, as shown in Figs. 2 and 3, with a cover plate 7 and a bottom plate 8 both made of a paper material, thus constituting a fiber drum D. The cover plate 7 and the bottom plate 8 are of a disk shape and reinforced at outer edge with reinforcement ribs 11 and 12, respectively, which are annular in plan view. The cover plate 7 and the bottom plate 8 are detachably mounted to the corresponding curled portions 5 and 6 at the one opening 3 and the other opening 4, respectively. The joints between the cover plate 7 and the curled portion 5 and between the bottom plate 8 and the curled portion 6 are covered with a couple of tightening bands 9 and 10, respectively, to seal the fiber drum D.

Such that a first portion of an inner surface of the roll contacts a second portion of the roll so

[0019] The fiber drum D comprises the cylindrical body 1, the cover plate 7, and the bottom plate 8 made of the paper material, employing no metal. Accordingly, when out of use and discarded, the fiber drum D requires no traditional separation into paper and metal. As the curled portions 5 and 6 are inwardly curled, they develop no tension towards the radial direction and will be prevented from generation of flaws as compared with outwardly curled portions. The curled portions 5 and 6 are tilted radially and outwardly of the cylindrical body 2 and can thus be joined to the cover plate 7 and the bottom plate 8 more closely while being covered with their respective tightening bands 9 and 10. This eliminates the need of specific seals or packings. While the curled portions 5 and 6 of the cylindrical body 1 according to the present invention are rigid enough without being pressed down, their pressed-down structure having no hollow space will contribute to increased physical strength of the cylindrical body 1. Moreover, because the difference between the curled portions 5 and 6 and the other portion of the cylindrical body 1 is as small as 1 mm, the inner side of the cylindrical body 1 may be less undulated. Accordingly, any content such as powder can successfully be removed from the fiber drum D without being trapped.

[0020] The present invention is not limited to the embodiment with the tightening bands provided about the one opening 3 and the other opening 4 for sealing the drum. For closing the other opening 4 of the cylindrical body 1, the curled portion 6 may be bonded by an adhesive to a bottom member 80 which comprises a bottom portion 81 and a flange portion 82 extending from an edge of the bottom portion 81 as shown in Fig. 11. Similarly, the one opening 3 of the cylindrical body 1 may be closed with a cover member (not shown), which comprises a cover portion and a flange portion extending from an edge of the cover portion, bonded to the curled portion 5 by an adhesive.

[0021] A method of fabricating the cylindrical body 1 will now be described.

[0022] The method starts with a step of forming a green cylindrical body 1a as shown in Fig. 4. More specifically, a length of paper sheet S coated at its upper side with an adhesive Q before curing is wound in seven to eight layers on a mandrel of a drum forming machine (not shown) to form a roll 2 of the green cylindrical body 1a. The adhesive Q may be any commercially available hydrophilic adhesive composed mainly of e.g. poly-vinyl acetate emulsion or poly-vinyl alcohol.

[0023] The green cylindrical body 1a is then transferred to perform a curled portion forming step which may be carried out by a forming machine M shown in Fig. 5. The forming machine M

(A) Stated otherwise, a radial distance between a line that is tangent to an inner circumferential surface of the curled portions 5 or 6 and a line defined by an inner cylindrical surface of the cylindrical body 1 is represented by dimension "L" and is no greater than 1 mm.

Body 1
is
less
undulated
such
that

layers of the edge 13a of the green cylindrical body 1a are squeezed out, hence running over the inner side of the roll 2. As a result, these portions of the adhesive Q may contribute to higher adhesiveness and when cured, the improved rigidity of the curled portions 5 and 6.

[0028] By the above manner, the curled portions 5 and 6 of the roll 2 are formed at the one opening 3 and the other opening 4, respectively. As known, the curled portions 5 and 6 are instantly formed in sequence. Then, as the adhesive Q is cured between the layers of the paper sheet into a cured adhesive Qa, the curled portions 5 and 6 are increased in rigidity.

[0029] This is followed by retracting the first chuck 16a from the curled portions 5 and 6 and lowering the pressing member 14 further as shown in Fig. 8. As moved along the tapered surface 21 of the outer side of the forming die 15, the curled portion 5 is turned outwardly. If the tilting angle is too large, the curled portion 5 may have flaws extending radially. When the tilting angle is too small, the effect of a tightening band or the like will be diminished. It is thus essential to determine an appropriate angle of tilting for ensuring the effect of the tightening band and eliminating the generation of flaws.

such that the curled portion forms an angle with an outer surface of the roll 2 that is between 0° and 180°

[0030] As shown in Fig. 9, the tilted curled portion 5 is held directly in contact with the tapered surface 21 of the forming die 15, and then the second chuck 16b is advanced in the direction X denoted by the arrow in Fig. 9 to press down the curled portion 5. Any hollow space in the curled portion 5 may decrease the physical strength at the opening of the roll 2. The pressing down of the curled portion 5 may require a pressing force of 30 tons. The cylindrical body 1a of this embodiment is rigid enough and its physical strength may be increased by pressing down the curled portions 5 and 6 to eliminate any hollow space.

So as to form a pressed curled portion that forms an angle with the outer surface of the roll 2 that is between 0° and 180°

[0031] As explained above, the three steps for forming, tilting, and pressing the curled portions 5 and 6 are carried out in the single forming machine M, which thus contributes to down sizing and a simpler arrangement of the fabricating system.

[0032] The present invention is not limited to the curled portions 5 and 6 provided on the edges at the openings 3 and 4 of the roll 2, but may be implemented with a curled portion 23 formed by inwardly curling the edge at the bottom opening 4 of the roll 2 together with the edge of the disk bottom plate 8 made of the same paper material to thus constitute the cylindrical body 1 of a fiber drum D2 as shown in Fig. 10. Similar to the first embodiment, the curled portion 23 is also pressed